

**CLASS XII – PHYSICS**  
**MODEL QUESTION PAPER**  
**(SET – 5)**

**Time Allowed: 3 Hours**

**Maximum Marks: 70**

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**General Instructions:**

1. All questions are compulsory.
  2. Use of calculator is not permitted.
  3. Draw neat and properly labelled diagrams wherever required.
  4. Internal choices are provided wherever applicable.
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**Question Paper Design**

- **Total Questions:** 33
  - **Section A:** 16 Questions (12 MCQs + 4 Assertion–Reason)  $\times 1 = 16$
  - **Section B:** 5 Questions  $\times 2 = 10$
  - **Section C:** 7 Questions  $\times 3 = 21$
  - **Section D:** 2 Case Study Based  $\times 4 = 8$
  - **Section E:** 3 Questions  $\times 5 = 15$
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**SECTION A (1  $\times$  16 = 16 Marks)**

**Q1–Q12: Multiple Choice Questions**

1. The electric field at a point due to dipole at equatorial line varies as:  
(a)  $1/r$   
(b)  $1/r^2$   
(c)  $1/r^3$   
(d)  $r$

2. If dielectric constant increases, capacitance:
  - (a) Decreases
  - (b) Increases
  - (c) Becomes zero
  - (d) Remains constant
  
3. The magnetic force on current carrying conductor is given by:
  - (a)  $BIL$
  - (b)  $qvB$
  - (c)  $B^2IL$
  - (d)  $IL$
  
4. Induced emf is measured in:
  - (a) Ampere
  - (b) Henry
  - (c) Weber
  - (d) Volt
  
5. The power dissipated in AC circuit is maximum when:
  - (a) Power factor = 0
  - (b) Power factor = 1
  - (c) Power factor =  $\frac{1}{2}$
  - (d) Power factor =  $\infty$
  
6. The resolving power of microscope increases when:
  - (a) Wavelength increases
  - (b) Wavelength decreases
  - (c) Aperture decreases
  - (d) Focal length increases
  
7. The work function is expressed in:
  - (a) Joule
  - (b) Volt
  - (c) Watt
  - (d) Coulomb
  
8. Nuclear radius varies as:
  - (a)  $A$
  - (b)  $A^2$
  - (c)  $A^{1/3}$
  - (d)  $1/A$
  
9. The magnetic field inside toroid is:
  - (a) Uniform

- (b) Zero
  - (c) Infinite
  - (d) Variable
10. The ratio of secondary to primary voltage in transformer is equal to:
- (a) Current ratio
  - (b) Power ratio
  - (c) Turns ratio
  - (d) Resistance ratio
11. At resonance in LCR circuit, current is:
- (a) Minimum
  - (b) Maximum
  - (c) Zero
  - (d) Infinite
12. The binding energy of nucleus is due to:
- (a) Gravitational force
  - (b) Electrostatic force
  - (c) Nuclear force
  - (d) Magnetic force
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### **Q13–Q16: Assertion–Reason Type**

13.

Assertion (A): Electric field inside hollow charged conductor is zero.

Reason (R): Charges reside on outer surface.

14.

Assertion (A): In AC circuit containing only inductor, current lags voltage by  $90^\circ$ .

Reason (R): Inductor opposes change in current.

15.

Assertion (A): Short wavelength light has higher energy.

Reason (R): Energy of photon is inversely proportional to wavelength.

16.

Assertion (A): Fusion releases more energy than fission per nucleon.

Reason (R): Binding energy per nucleon increases for light nuclei.

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## **SECTION B ( $2 \times 5 = 10$ Marks)**

17. Define Gauss's law and write its mathematical expression.
  18. Define resistivity and write its unit.
  19. What is electromagnetic induction?
  20. Define diffraction of light.
  21. What is radioactive decay constant?
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## **SECTION C ( $3 \times 7 = 21$ Marks)**

22. Derive expression for potential energy of electric dipole in uniform electric field.
  23. Derive expression for equivalent resistance in series and parallel combination.
  24. Derive expression for magnetic field inside long solenoid.
  25. Explain construction and working of compound microscope.
  26. Derive expression for average power in AC circuit.
  27. Explain photoelectric effect and write its laws.
  28. Explain nuclear fission and chain reaction.
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## **SECTION D (Case Study Based) ( $4 \times 2 = 8$ Marks)**

### **29. Case Study: Electric Dipole**

An electric dipole is placed in uniform electric field.

- (a) Define dipole moment.
  - (b) Write expression for torque.
  - (c) What is stable equilibrium?
  - (d) What is potential energy at  $90^\circ$ ?
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### **30. Case Study: Radioactivity**

A radioactive sample decays with time.

- (a) Define half-life.
- (b) Relation between half-life and decay constant.

(c) Define activity.

(d) What happens to activity with time?

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### **SECTION E (5 × 3 = 15 Marks)**

31. Derive Gauss's law and apply it to find electric field due to infinite plane sheet.

32. Explain construction and working of transformer and derive emf equation.

33. Derive expression for de-Broglie wavelength and explain its significance.